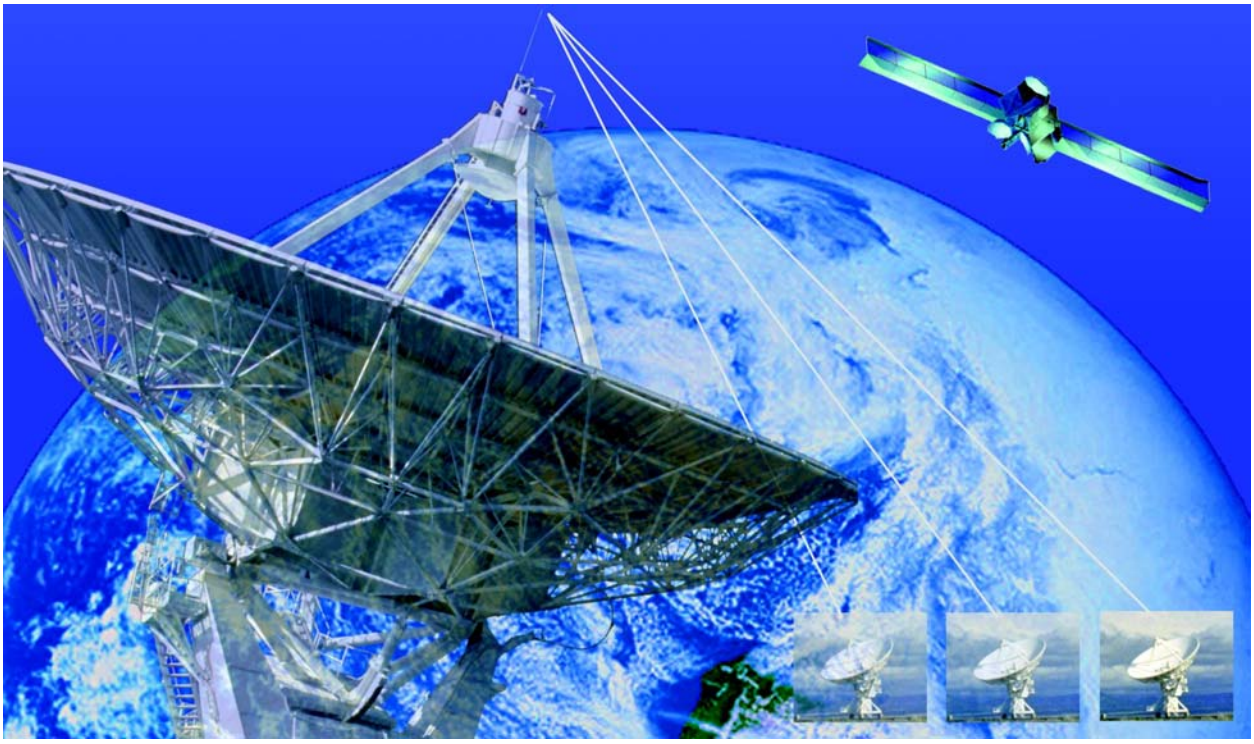
SE-1010 / SE-2000 Encoder Product Manual

Version 1.0



Document Number: 504834-001

MOTOROLA
Broadband Communications Sector

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SE-1010 / SE-2000 ENCODER

To Original Commercial Purchaser

General Instrument Corporation doing business as the Broadband Communications Sector of Motorola, Inc. ("Motorola BCS") hereby warrants only to the original commercial purchaser of SE-1010 / SE-2000 Encoder(s) ("Encoder") ("You"), that such Encoder and the media upon which any software is furnished in connection with the Encoder shall be free from defects in material and workmanship for a period of twelve (12) months commencing from date of shipment for commercial use.

The warranties set above shall not apply (i) to any Encoder or media subjected to accident, misuse, neglect, alteration, improper handling, improper transport, improper storage, improper use or application, improper installation, improper testing or unauthorized repair, or (ii) to cosmetic problems or defects which result from normal wear and tear under ordinary use, and do not affect the performance or use of the Encoder or media.

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1

Introduction

Congratulations on the recent purchase of Motorola's SE-1010 / SE-2000 Encoder. The SE-1010 / SE-2000 Encoder represents Motorola Broadband Communication Sector's (BCS) sixth generation video compression technology in a compact chassis that is ideally suited for the cable headend, small broadcast, and high bandwidth contribution applications.

The SE-1010 / SE-2000 Encoder follows Motorola BCS's long tradition for providing exceptional video quality such as:

- Automatic film detection and telecine processing
- Adaptive field/frame processing
- Scene change detection
- Adaptive quantization level processing
- Digital Video Broadcasting (DVB) compliance
- Support for 4:2:0 and 4:2:2 encoding modes (The SE-1010 Encoder supports only 4:2:0.)
- Pure Pixel™ two-pass encoding (The SE-1010 Encoder does not have this feature.)
    - Adaptive temporal/spatial noise filtering
    - ScenePreview scene change detection
    - Proactive buffer management
    - Improved motion estimation processing

The encoder's easy-to-use features include:

- Front panel or SNMP control
- Factory preset and user modifiable configurations
- Flexible input and output options

This product manual provides critical information to set up and configure the SE-1010 / SE-2000 Encoder. Please read this manual before starting installation.

SE-1010 / SE-2000 Applications

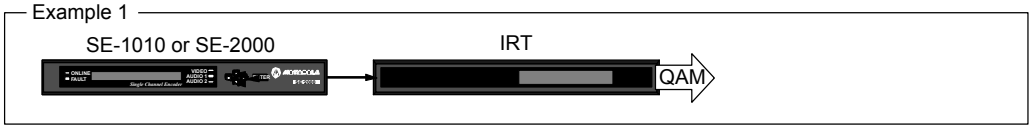
The SE encoder is ideal for encoding at digital cable head-ends, electronic newsgathering, ATSC broadcasting, and for DVB satellite distribution.

Note: *Please refer to the documentation that comes with the IRT, TMX-2010, and/or MPS for configuration information of those devices. Because the SE encoder does not output system time, the downstream device must supply system time.*

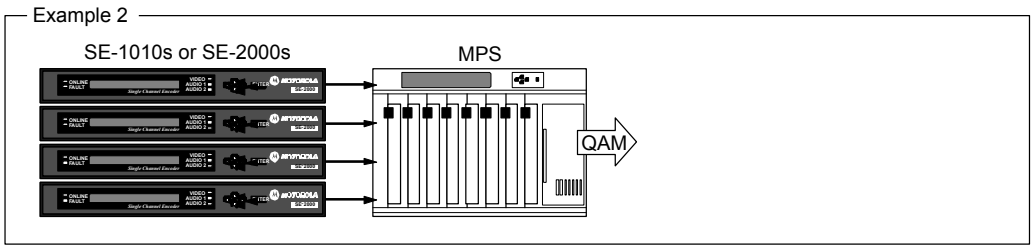
For the SE encoder-to-IRT application, an SNTP Time Server must be used to provide system time to the IRT. For part numbers and other details, see *"Connectors and Required Cables" on page 31*.

For digital cable head-ends, a number of SE encoders can be used to digitize analog programming for inclusion in the digital tier. The following high-level diagrams show example configurations.

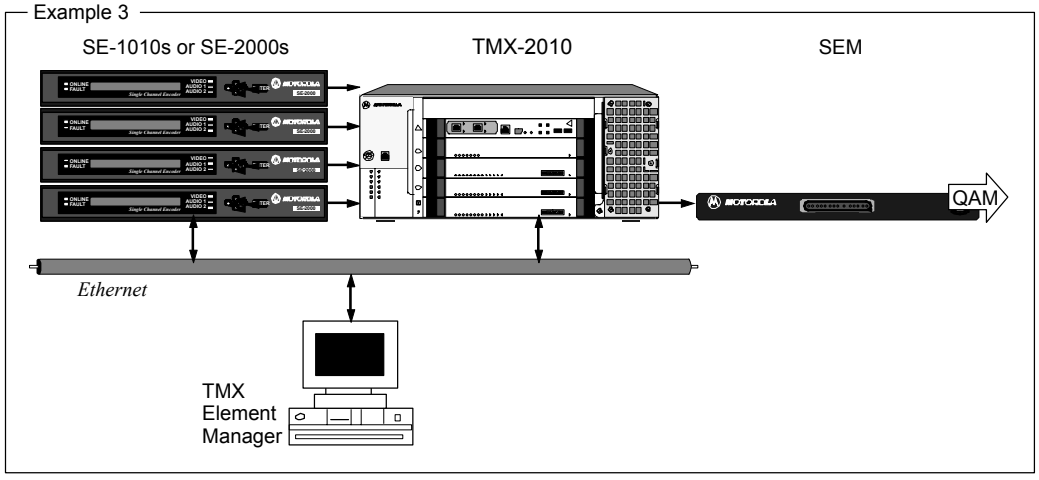
Example 1 shows an SE encoder connected to an IRT.



Example 2 shows several SE encoders connected to an MPS.



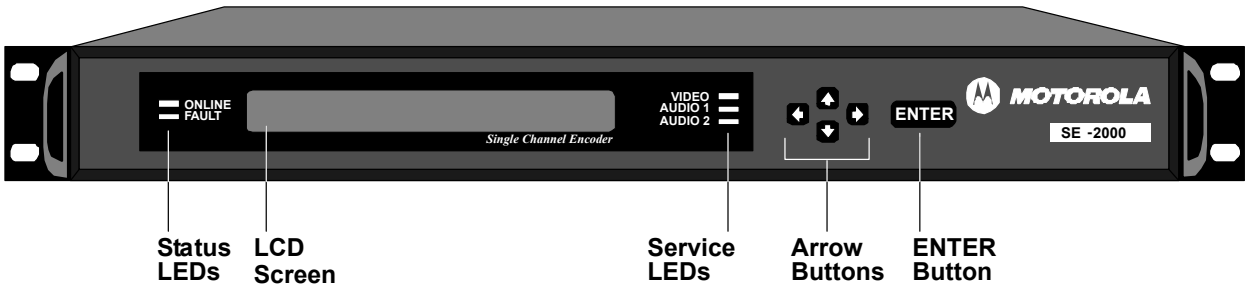
Example 3 shows SE encoders connected to a TMX-2010 that is connected to a SEM.



2

Installation

The information in this chapter provides easy guidelines for installing the SE encoder. The following diagram shows the front panel:



Inventory and Installation

To prevent damage and/or safety hazards, always handle the SE encoder with care. Use the SE encoder only according to instructions provided in this product manual. For part numbers and other details, see "Connectors and Required Cables" on page 31.

Inventory

Verify that the shipping carton contains the following items:

- An SE-1010 or SE-2000 encoder with attached mounting brackets
- *SE-1010 / SE-2000 Encoder Product Manual* (this manual)
- *SE-1010 / SE-2000 Encoder Release Notes*
- Detachable EIC power cord
- Three (3) Phoenix connectors (2 audio, 1 Form_C)
- One (1) DHEI cable
- One (1) clip-on cord retainer
- Four (4) phillips screws
- Four (4) washers

Mounting

The encoder with the supplied mounting brackets is designed for installation in an EIA standard 19-inch (480 mm) equipment rack. When mounting the encoder in a rack, use pan or round head screws and washers in all four front panel mounting locations. This ensures a secure mount for the size and weight of the unit. Please provide screws that match the rack.

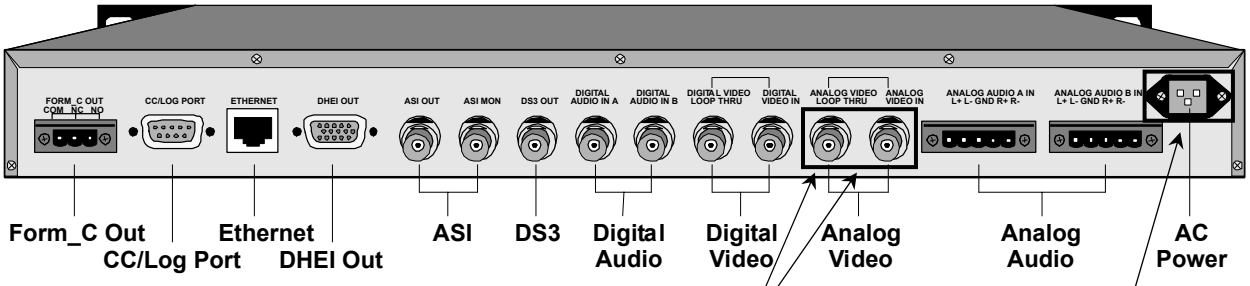
SE encoders are stackable, one on top of another, within a rack, without any spacing requirements. Place each SE encoder in a stable and level position within the rack and ensure that all front enclosure screws are tightened to 2 ft.-lbs. If multiple SE encoders are installed in a rack assembly, the operator may choose to have a certification agency evaluate the condition of the rack.

Positioning

When positioning the SE encoder:

- To prolong service life, make sure that the area around the SE encoder is free of dust and other airborne particles.
- Operate the SE encoder in a temperature-controlled environment. Do not place the encoder near a heat source.
- Do not install multiple SE encoders so that the air intake from one unit is aligned with the outlet of another.
- Do not install an SE encoder in areas of high humidity or where water can infiltrate the unit.
- To avoid magnetic interference from the high-voltage cable, do not run AC power cables and signal leads in the same duct.

For signal information for the various connectors, see “Connector Pinouts” on page 29. The following diagram shows the back panel.



Note: *For applications that use the Analog Video In connector, attach a 75–ohm termination to the Analog Video Loop Thru connector.*

Note: *Clip the supplied cord retainer on the two standoffs.*

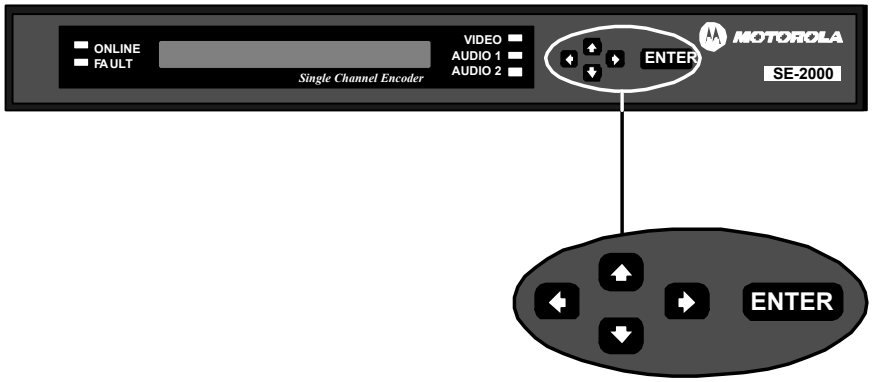
3

Basic Operation

Navigation

When the encoder powers up, the Liquid Crystal Display (LCD) displays the software version:

Use the front panel's four arrow and ENTER buttons to navigate the LCD's two 40-character lines.



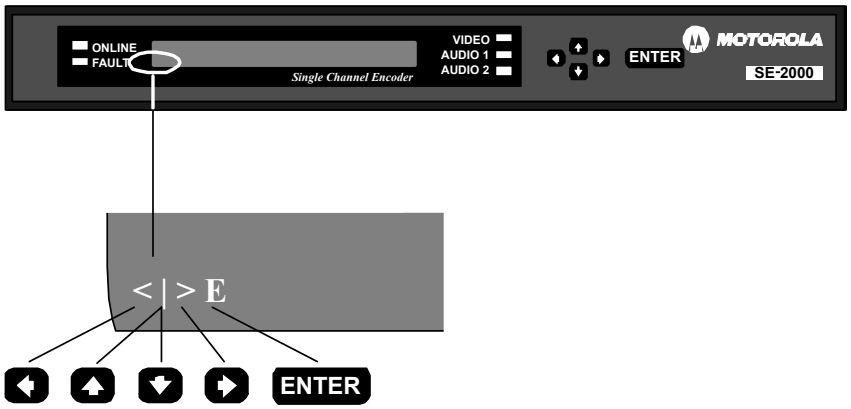
Use the up (/\ ) and down (\/) arrow buttons to scroll through the following nine menus:

- Preset
- Transport Output
- Service Name
- Network Type
- Control
- Misc. (Miscellaneous)
- Test
- Status Log
- Reset

Continue using the up (/\ ) and down (\/) arrow buttons until the Preset menu displays as shown below.

Navigational Legend

The first four characters on the Edit Line (second line) show the navigational legend. The legend shows which arrow buttons can be used to navigate through menus. The following diagram shows the legend with the corresponding arrow and ENTER buttons.



< indicates that you can press the left (<) arrow button.

> indicates that you can press the right (>) arrow button.

| (vertical line) indicates that you can press the up (/\ ) or down (\/) arrow button.

E indicates that you can press the ENTER button.

Menu Description

The LCD screen's top line is named the Menu Line and it displays all the menu options. The bottom line is named the Edit Line and it displays the navigational legend and all encoder options. Each of the nine menus has a Menu Line and Edit Line.

The Preset menu has the following eight options:

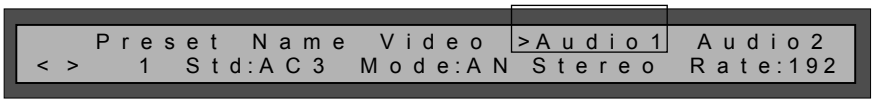
Preset Name Video Audio1 Audio2 VBI PID PGM

Because this menu has more options than the LCD screen can display at one time, press the left and right arrow buttons to see the other options.

Note: *"Preset" is the name of this menu, so the word "Preset" does not scroll. Only the options scroll.*

Selecting an Option

Use the left and right arrow buttons to move the pointer to Audio1 option.



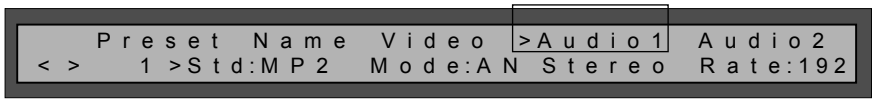
Note: *Always verify that the pointer (>) appears at the left of the option. To assist the reader to see the selected area, this manual shows a box around the selected option as shown above.*

Editing an Option

To edit an option

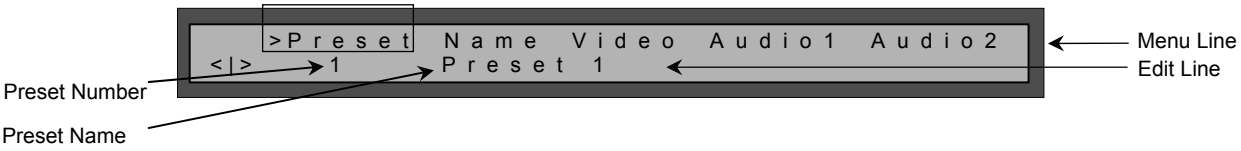
1. Navigate to the desired option on the Menu Line and press the ENTER button. A blinking cursor appears on the Edit Line.
2. Go to the Std option. To move the cursor right and left, press the left and right arrow buttons.
3. To change the setting to MP2, use the up and down arrow buttons.

   The diagram below shows the Preset menu with Audio1 selected and Std is set to MP2.
4. To confirm the change and return the pointer to the Menu Line, press the ENTER button.



Activating Presets

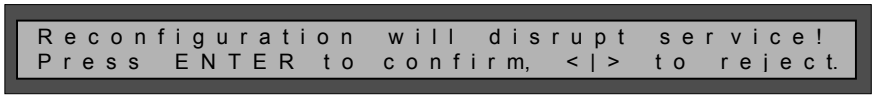
The Preset menu has 30 presets. Preset options can be changed as needed. Each time a setting is changed and the ENTER button is pressed, the change is saved as part of the current preset. Notice that the change made on page 7 of this manual applies to Preset 1.



After redefining several options within a preset, the operator will want to navigate to another preset and make changes there also. The presets are numbered 1 to 30 and each preset has a name. For example, an operator may want to change "Preset 1" to "High Res NTSC."

To activate another preset

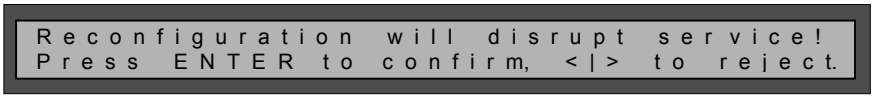
1. Navigate to the Preset menu and use the left and right arrow buttons on the Menu Line to position the pointer (>) to the left of Preset as shown above.
2. Press the ENTER button to move the blinking cursor to the Edit Line. The blinking cursor should be on the Preset number.
3. Use the up and down buttons to select the desired Preset number.
4. Press the ENTER button to select that Preset.
5. Verify that the LCD displays the following warning message:



6. To confirm, press the ENTER button again.

   or

   To stay with the current preset and remove the warning message from the LCD screen, press any of the four arrow buttons (Left, Right, Up, or Down).

CAUTION	*To maintain uninterrupted service, always make changes while offline. Making important changes to the SE encoder will display the following message which is displayed any time the change will result in a service interruption.* 

SE Encoder Factory Presets

Table 1 shows the encoder's 30 factory-defined presets. To restore the presets to their default settings, see "Reset Menu" on page 26.

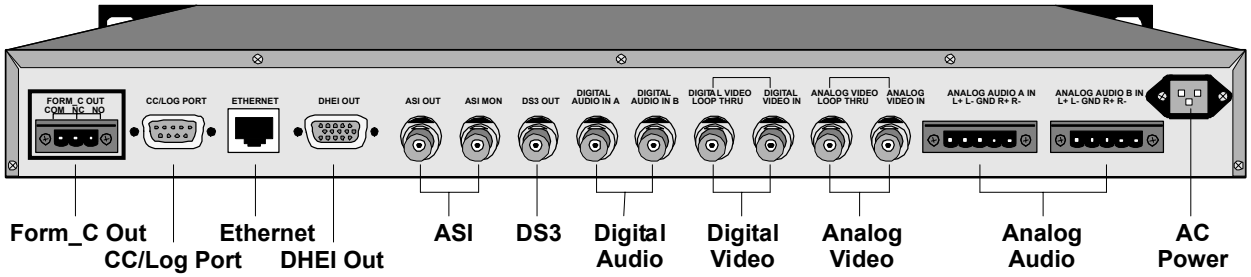
Table 1 Default Settings For Factory-defined Presets

Menu : Option	Presets							
	1	2	3	4	5	6	7	8 – 30
Video : In	NTSC	525SDI	NTSC	525SDI	NTSC	525SDI	NTSC	525SDI
Video : Res	528 x 480	528 x 480	352 x 480	352 x 480	704 x 480	704 x 480	704 x 480	704 x 480
Video : Rate	4.00 Mbps	4.00 Mbps	3.00 Mbps	3.00 Mbps	5.00 Mbps	5.00 Mbps	8.00 Mbps	8.00 Mbps
Video : GOP (Length)	15	15	15	15	15	15	15	15
Video : Film	On	On	On	On	On	On	On	On
Video : Aspect	4:3	4:3	4:3	4:3	4:3	4:3	4:3	4:3
Video : Fmt	4:2:0	4:2:0	4:2:0	4:2:0	4:2:0	4:2:0	4:2:0	4:2:0
Audio : Std	AC3	AC3	AC3	AC3	AC3	AC3	AC3	AC3
Audio : Mode	AN Stereo	DG Stereo	AN Stereo	DG Stereo	AN Stereo	DG Stereo	AN Stereo	DG Stereo
Audio : Rate	192 kbps	192 kbps	192 kbps	192 kbps	256 kbps	256 kbps	256 kbps	256 kbps
Audio1 : Language	eng	eng	eng	eng	eng	eng	eng	eng
Audio2 : Language	eng	eng	eng	eng	eng	eng	eng	eng
Audio : DialNorm	-31 dB	-31 dB	-31 dB	-31 dB	-31 dB	-31 dB	-31 dB	-31 dB
PID : V (Video)	0032	0032	0032	0032	0032	0032	0032	0032
PID : A1 (Audio 1)	0033	0033	0033	0033	0033	0033	0033	0033
PID : A2 (Audio 2)	0034	0034	0034	0034	0034	0034	0034	0034
PID : P (PMT)	0035	0035	0035	0035	0035	0035	0035	0035
PID : W (WST)	0036	0036	0036	0036	0036	0036	0036	0036
PGM	00001	00001	00001	00001	00001	00001	00002	00002

Note: *All other parameters are 0, No, or disabled.*

Fault and Alarm

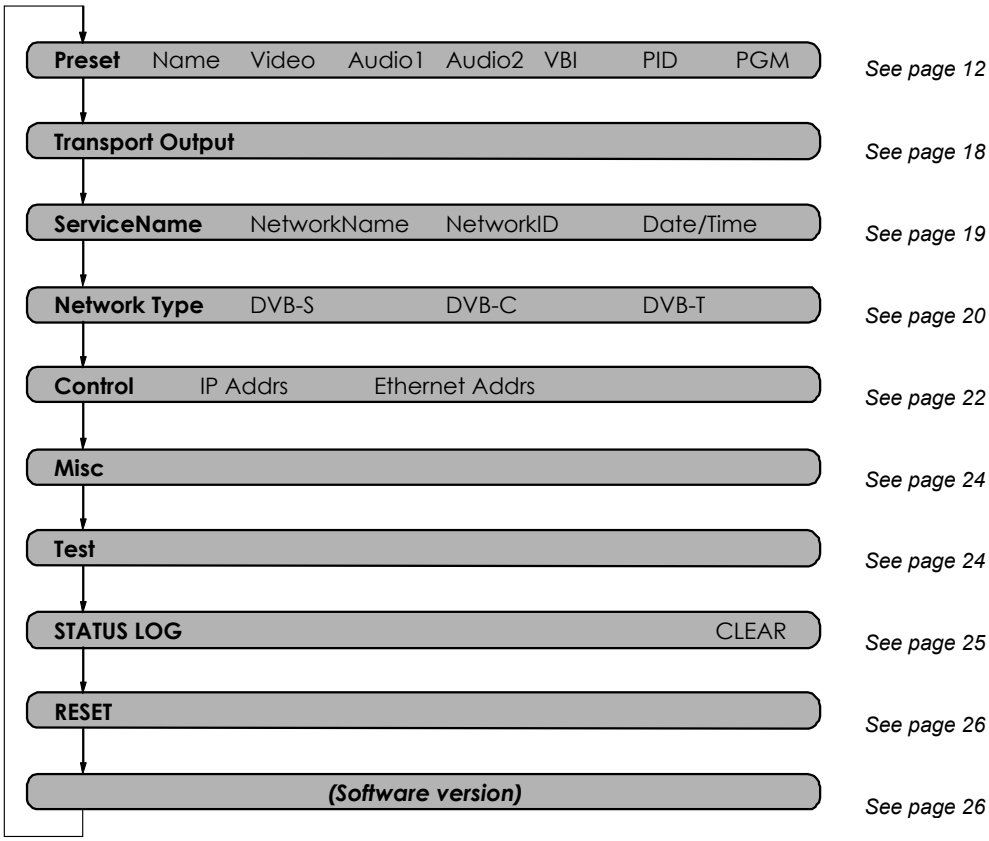
The SE encoder provides a Form_C contact closure to trigger alarm equipment. The following diagram shows the Form_C port on the left of the back panel. To view the error messages that will activate the Form_C, see Table A1 on page 28. For Form_C pinouts, see "Connector Pins" on page 29.



4

Menus

This chapter contains diagrams of SE encoder menus and describes the options available to view and/or change. The following navigational diagram shows the menu hiearchy and a page number where each menu is described in detail.

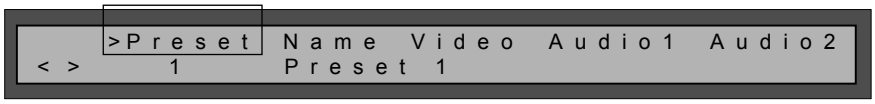


Preset Menu

The SE encoder has 30 presets. To review the factory-defined presets, see Table 1 on page 9. Use the Preset menu to select the desired preset configuration.

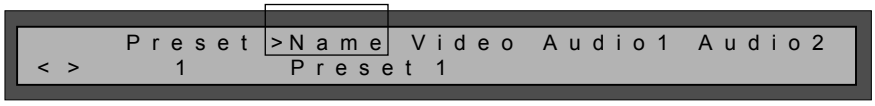
To access the Preset menu and view options

1. Navigate to the Preset menu as shown below:



2. Press the right arrow (>) button to access the submenu: Name, Video, Audio1, Audio2, VBI, PID, or PGM.

Name Parameter



To change the name of a preset

1. To access the Name parameter in the Preset menu, press the right arrow (>) button until the pointer is in front of the name and press ENTER.
2. Press the right and left arrow buttons to move the pointer to the name.
3. For each character in the name:
   - Use the up and down arrow buttons to enter another letter or number.
   - Use the right arrow button to move the cursor to the next character.
   - Use the left arrow button to move the cursor backward.

Note: *Names can be up to 28 characters.*
To insert a space, choose the underscore character (_).

4. After changing the name, press the ENTER button.

Video Options

To access a preset's video options, press the right arrow (>) button until the pointer is in front of Video and press ENTER. Use the arrow buttons to view or change video options. Table 2 describes each option.

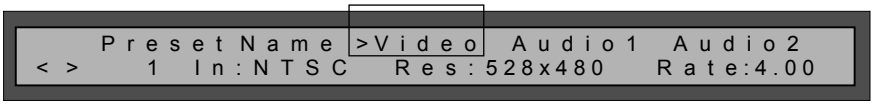


Table 2 Video Options

Option	Definition	Description
In	Input	Use this option to select an input and format type: NTSC : Selects NTSC analog composite input PAL : Selects PAL analog composite input PAL-M : Selects PAL 525 analog composite input 525SDI : Selects Serial Digital Component Video, 525 line 625SDI : Selects Serial Digital Component Video, 625 line OFF : Video is not enabled
Res	Resolution	Use this option to select a horizontal resolution: 720, 704, 544, 528, 480, or 352. For NTSC, PAL-M, and 525SDI, the vertical resolution is 480. SE-2000 encoders also supports a vertical resolution of 512. For PAL and 625SDI, the vertical resolution is 576. Higher resolutions give improved picture detail, but require higher bitrates to maintain details without noticeable compression artifacts.
Rate	Bit Rate	Select the desired video packet bit-rate (video transport stream rate) as shown below: SE-1010 : 1.00 Mbps to 15.00 Mbps (in 10 kbps increments) SE-2000 : 0.50 Mbps to 15.00 Mbps (in 10 kbps increments)
GOP	Group of Pictures (refresh rate).	Use this option to select a GOP rate: 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, or 30. The default is 15. GOP is the number of frames that occur before an I frame is repeated. For example, a selection of 15 results in this sequence: I B B P B B P B B P B B P B B I 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1
Temporal	Temporal Filter	*SE-2000 Only* Select the desired Pure Pixel motion adaptive temporal filter: OFF, AUT (automatic), or a value from 1 to 10. 1 is the weakest filtering and 10 is the strongest filtering.
BWFilter	Brick Wall Filter	*SE-2000 Only* Select the desired Pure Pixel adaptive spatial filter: OFF, AUT (automatic), or a value from 1 to 10. 1 applies the weakest filtering and 10 applies the strongest filtering.
Film	Film Mode	Use this option to enable (ON) or disable (OFF) the film-mode detection for 3:2 pulldown.
Aspect	Aspect Ratio	Select the desired screen resolution signaling: 4:3 (standard aspect ratio) or 16:9 (widescreen aspect ratio).
Fmt	Format	*SE-1010 Only* The LED displays 4:2:0 (for standard distribution feeds). This value is read-only and cannot be changed. *SE-2000 Only* Select the desired MPEG profile video: 4:2:0 (for standard distribution feeds) or 4:2:2 (for high-quality contribution feeds).
StatMux	Statistical Multiplexing	During normal standalone operation, this read-only field is set to OFF.

Audio1 and Audio2 Options

The Audio1 and Audio2 menus operate in the same way. To view or change the Audio1 or Audio2 parameter in the Preset menu, press the right arrow (>) button until the pointer is in front of the Audio1 or Audio2 option. The following diagram shows the pointer in front of Audio1. Table 3 describes each option.

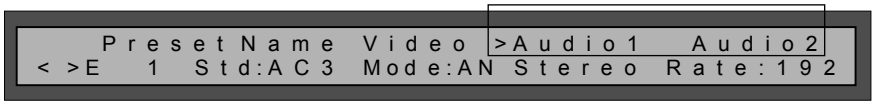


Table 3 Audio1 / Audio2 Options

Option	Definition	Description
Std	Audio Standard	Use this option to select the desired audio standard: AC3, MP2 (MPEG Layer 2), or OFF. For all ATSC and DigiCipher® II applications, select AC3. The OFF selection disables audio.
Mode	Audio Mode	This Audio Mode option has a prefix (to set the desired input) and a suffix (to set the desired audio compression). First use the up and down arrow buttons to select the desired input: SDI : Extracts embedded audio from the SDI video input (CCIR601). See SDI Channel at the bottom on next page. DG : Takes audio from external digital audio input. AN : Takes audio from the analog audio input. To access the suffix, press the right arrow (>) and use the up and down arrow buttons to set the desired audio processing: Stereo, Joint, Mono L, Mono, Mono R, Dual (Dual Mono), or Precmp (pre-compressed). ***Note:*** *Most applications use Stereo coding for the primary audio, and either Stereo or Dual Mono for the Secondary Audio Programs (SAP).*
Rate	Audio Rate	Use this option to select the audio compression rate in kbps (elementary stream bitrate). The options are 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, and 640. For more details, see “Audio Processing” at the bottom of page 34.

(Audio1/Audio2 options are continued on the next page.)

Option	Definition	Description
Language	Language	Use this option to select a 3-character audio language. For example, select eng (English) for Audio1 and spa (Spanish) for Audio2. Use the up and down arrow buttons to access: eng, spa, fre, ita, ger, and chn. Then, to access any of the other languages listed below, use the up and down arrow buttons to change all three characters.

Language	Code	Language	Code
Arabic	ara	Japanese	jpn
Armenian	arm	Javaneses	jav
Balinese	ban	Kashmiri	kas
Basque	baq	Korean	kor
Batak (Indonesian)	btk	Kurdish	kur
Bengali	ben	Latin	lat
Bhojpuri	bho	Malay	may
Bulgarian	bul	Mandarin	mdr
Burmese	bur	Marathi	mar
Catalan	cat	Misc. Language	mis
Chinese	chi	Mongolian	mon
Croatian	scr	Nepali	nep
Cue (Tones)	cue	Norwegian	nor
Czech	cze	Otomian	oto
Danish	dan	Pahlavi	pal
Dutch	dut	Panjabi	pan
Egyptian	egy	Persian	per
English	eng	Philippine (Other)	phi
Esperanto	epo	Polish	pol
Faroese	fao	Portuguese	por
Finnish	fin	Rajasthani	raj
French	fre	Romanian	rum
German	ger	Russian	rus
Greek	gre	Samoan	smo
Gujarati	guj	Scots	sco
Hebrew	heb	Sindhi	snd
Hindi	hin	Swahili	swa
Hiri Motu	hmo	Swedish	swe
Hungarian	hun	Tagalog	tgl
Indonesian	ind	Tamil	tam
Interlingua	ina	Thai	tha
Iranian	ira	Urdu	urd
Irish	iri	Vietnamese	vie
Italian	ita	Welsh	wel

DynRng	Dynamic Range	Select the audio encoding information within the Dolby™ audio: Film Std, Film Light, Music Std, Music Light, or Speech. To ignore the encoding information, select Disabled. The default is Film Std.
DialNorm	Dialog Normalization	Select the level (-31 to -1 dB) of dialog below the maximum audio level. The default is -31.
SDI Channel	Embedded Audio Channel	This option is set to None (Not Identified) unless the Mode option (described on page 14) is set to SDI. Use this option to select the audio channel within the SDI video: 1,2; 3,4; 5,6; 7,8; 9,10; 11,12; 13,14; or 15,16).

VBI Options

To view the Vertical Blanking Interval (VBI) options, go to the Preset menu, press the right arrow (>) button until the pointer is in front of the VBI, and press ENTER. Now use the up and down arrow buttons to access each VBI option. To enable or disable an option, press the left or right arrow button. When all options are set, press ENTER to return to the Menu Line (top line).

Important: *The options in this menu will vary depending on the current setting for video IN (input) option. The video IN option is described at the top of Table 2 on page 13. If IN is set to NTSC, PAL-M, or 525SDI, use Table 4 to view or change the options. If IN is set to PAL or 625SDI, use Table 5 to view or change the options.*

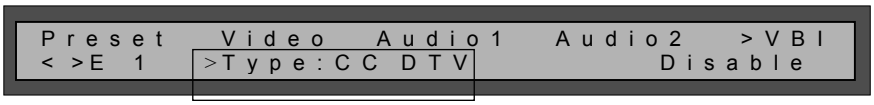


Table 4 VBI Options – When video input is set to NTSC, PAL-M, or 525SDI

Option	Definition	Description
Type:CC DTV	ATSC Closed Caption	Use this option to specify that the signal contains closed caption information for ATSC-compliant receivers.
Type:CC DCII	DigiCipher II Closed Caption	Automatically enables Line 21, field one and two (1 and 2). Field 1 is for Closed Caption and field 2 is for V-chip. Use this option for DigiCipher II applications.
Type:SID/AMOL1 1/20 Type:SID/AMOL1 2/22	Source ID (SID) Automated Measurement of Lineups (AMOL) 1	Use this option for changing Neilson Ratings information.
Type:SID/AMOL2 1/20 Type:SID/AMOL2 1/22 Type:SID/AMOL2 2/20 Type:SID/AMOL2 2/22	Source ID (SID) Automated Measurement of Lineups (AMOL) 2	Use this option for changing enhanced Neilson Ratings information.
Type:NABTS 1/10 *through* Type:NABTS 1/22	North American Teletext Standard, Field 1	Use this option to specify which lines (10 through 22) of field one (1) are enabled for NABTS.
Type:NABTS 2/10 *through* Type:NABTS 2/22	North American Teletext Standard, Field 2	Use this option to specify which lines (10 through 22) of field two (2) are enabled for NABTS.

Table 5 VBI Options – When video input is set to PAL or 625SDI

Option	Definition	Description
Type:WST 1/07 *through* Type:WST 1/22	World Standard Teletext	Use this option to specify which lines (07 through 22) of field one (1) are enabled for WST.
Type:WST 2/07 *through* Type:WST 2/22	World Standard Teletext	Use this option to specify which lines (07 through 22) of field two (2) are enabled for WST.

PID Options

To view or change the Packet Identification (PID) parameter in the Preset menu, press the right arrow (>) button until the pointer is in front of the PID option. Table 6 describes each PID option.

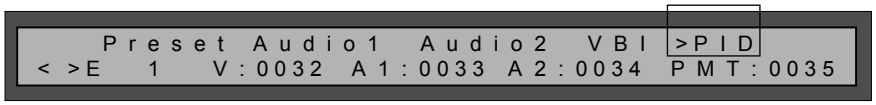
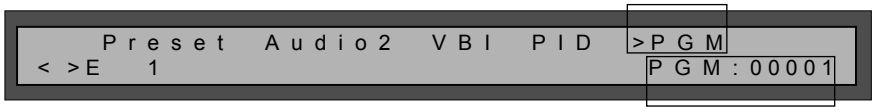


Table 6 PID Options

Option	Definition	Description
V	Video PID	Specify the video PID value (0032 through 8186). When the value for V is changed, the other options (A1, A2, PMT, and WST) are automatically updated to values of 1, 2, 3, and 4 more than the video PID, respectively. For example, setting V to 8186 will automatically set A1 to 8187, A2 to 8188, PMT to 8189, and WST to 8190. If these four values are not desired, set each value manually after setting the value for V.
A1	Audio 1 PID	Specify the Audio1 PID value (0032 through 8190).
A2	Audio 2 PID	Specify the Audio2 PID value (0032 through 8190).
PMT	Program Map Table PID	Specify the PMT PID value (0032 through 8190).
WST	World Standard Teletext PID	This menu option only appears if the Video submenu has the video input option (IN) set to either PAL or 625SDI and one or more WST Line is enabled. For details, see the first option in Table 2 on page 13 and Table 5 on page 16. Specify the WST PID value (0032 through 8190). WST is also know as EBU System B Teletext.

PGM Number

To view the MPEG Program number (PGM) in the Preset menu, press the right arrow (>) button until the pointer is in front of the PGM. To change the value, press the ENTER button, use the up and down arrow buttons to specify a number from 00001 to 65535, and press the ENTER button. The default is 00001.



Transport Output Menu

Use the Transport Output menu to view or change Mode, Rate, and ID. These settings apply to the SE encoder, rather than to an individual preset. Table 7 describes each option.

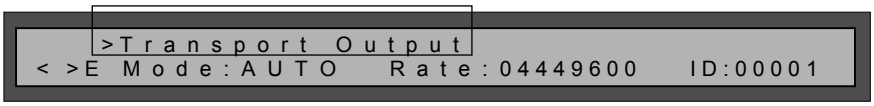


Table 7 Transport Output Options

Option	Definition	Description
Mode	Mode	Use the up and down arrow buttons to specify how the encoder determines the transport stream rate: AUTO : Sets the bandwidth to the sum of the components (i.e., Video, Audio1, and Audio2) within the transport stream. MANUAL : Sets the maximum bandwidth according to the value in the Rate option as described below.
Rate	Rate	When the Mode option is set to MANUAL, the SE encoder uses this eight-digit value to set the transport stream bandwidth. Use the up and down arrow buttons to set the desired bandwidth. Enter a value from 04449600 to 50000000 (4 to 50 Mbps). The last two digits of this eight-digit value (1234567<u>8</u>) always display 00 except as noted below. ***Note:*** *Setting the value to 26970300 will set the bandwidth to 26.970352943 Mbps and shows 26970353 on the front panel. Setting the value to 38810700 will set the bandwidth to 38.810701 Mbps and shows 38810701 on the front panel.*
ID	Transport Stream Identifier	Use this option to set the Transport Stream ID number within the system information. Use the up and down arrow buttons to set each of the five digits. Enter a value from 00001 to 65535. The default is 00001.

ServiceName Menu

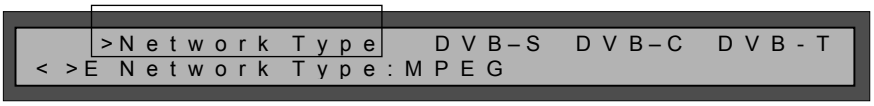
Making changes to this menu is only necessary if Network Type (described on page 20) is set to DVB-S, DVB-C, or DVB-T. These settings apply to the SE encoder, rather than to an individual preset. Use the Service Information menu to view or change options. Table 8 describes each option.

Table 8 ServiceName Options

Option	Definition	Description
ServiceName	Service Name	Use the up and down arrow buttons to set each character of the Service Name. The Service Name is transmitted in the service information and can be up to 29 characters.
NetworkName	Network Name	Use the up and down arrow buttons to set each character of the Network. The Network Name is transmitted in the service information and can be up to 16 characters.
NetworkID	Network Identifier	Use the up and down arrow buttons to set the 5-digit customer number (00001 to 65535). This number is assigned by the DVB service.
Date/Time	Date and Time	Use this option to set the Universal Time Cordinated (UTC) date and time to generate the Time and Date Table (TDT). The transmittal occurs only if the Network Type (described on page 20) is set to DVB-S, DVB-C, or DVB-T. This option uses the following format: DD-MMM-YYYY / hh:mm:ss DD : 2-digit number (01 to 31) that represents the a day of the month. MMM : 3-character word (JAN to DEC) that represents the a month of the year. Use the up and down arrows to cycle through the 12 months. YYYY : 4-digit number (0000 to 9999) that represents the year. hh:mm:ss : Time in hours, minutes, and seconds that range from 00:00:00 (for midnight) to 23:59:59 (one second before midnight).

Network Type Menu

Use this menu to define DVB configurations for satellite (DVB-S), cable (DVB-C), and terrestrial (DVB-T). These settings apply to the SE encoder, rather than to an individual preset.



To specify a network type

1. Navigate to the Network Type menu and press the right arrow button so the pointer (>) is in front of Network Type.
2. Press the ENTER button to move the blinking cursor to the Edit Line (second line).
3. Use the up arrow button to select the desired network type: MPEG, DVB-S, DVB-T, or DVB-C.
4. Press the ENTER button to move the cursor to the Menu Line (top line).

To define a DVB configuration

1. Navigate to the Network Type menu and press the right arrow button to specify the desired DVB configuration type (either MPEG, DVB-S, DVB-T, or DVB-C).
2. Press the ENTER button to move the blinking cursor to the Edit Line (second line).
3. Use Table 9, 10, or 11 to set the desired configuration.
4. Press the ENTER button to move the cursor to the Menu Line (top line).

Table 9 DVB-S (Satellite) Options

Option	Definition	Description
Freq	Downlink Frequency	Use the up and down arrow buttons to set the downlink frequency (000.00000 to 999.99999 GHz). The default is 011.75725 GHz.
Rate	Transport Symbol Rate	Use the up and down arrow buttons to set the desired transport symbol rate (000.0000 to 999.9999 Msps). The default is 056.3200 Msps.
FEC	Forward Error Correction	Use the up and down arrow buttons to choose one of the following options: 1/2, 2/3, 3/4, 5/6, 7/8 or None (Not Identified). The default is 3/4.
Orbit Pos	Orbital Position	Use the up and down arrow buttons to set the satellite's bearing (000.0 to 999.9 degrees). The default value is 019.2 deg.
Pos	Satellite's Orbital Position	Use the up and down arrow buttons to set the satellite's orbital position relative to the Greenwich Meridian: East or West. The default is West.
Polarization	Downlink Polarization	Use the up and down arrow buttons to set downlink polarization: Linear Horiz, Linear Vert, Circular Left, or CircularRight. The default is Linear Horiz.
ModQPSK	Modulation Type	During typical standalone mode, Modulation Type is read-only and is set to QPSK.

Table 10 DVB-C (Cable) Options

Option	Definition	Description
Freq	Cable Frequency	Use the up and down arrow buttons to set the cable frequency (0000.0000 to 9999.9999 MHz). The default is 0312.0000 MHz.
Rate	Transport Symbol Rate	Use the up and down arrow buttons to set the desired transport symbol rate (000.0000 to 999.9999 Msps). The default is 056.3200 Msps.
FEC	Forward Error Correction	Use the up and down arrow buttons to specify FEC rate: 1/2, 2/3, 3/4, 5/6, 7/8, or None (Not Identified). The default is 3/4.
RS	Reed Solomon Error Correction	Use the up and down arrow buttons to choose one of two options: None or RS(204/188). None means Not Identified. The default is RS(204/188).
Mod	Modulation Type	Use the up and down arrow buttons to choose: 16-QAM, 32-QAM, 64-QAM, 128-QAM, or 256-QAM. The default is 64-QAM.

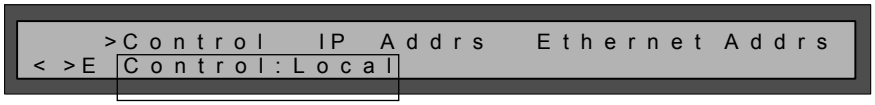
Table 11 DVB-T (Terrestrial) Options

Option	Definition	Description
CtrFreq	Center Frequency	Use the up and down arrow buttons to set the terrestial broadcast frequency (00,000,000,000 to 42,899,999,980 Hz). The default is 00,600,000,000 Hz.
B/W	Bandwidth	Use the up and down arrow buttons to specify the broadcast system's bandwidth (6, 7, or 8 MHz). The default is 8 MHz.
Mod	Modulation Constellation	Use the up and down arrow buttons to set the desired modulation mode: QPSK, 16QAM, or 64QAM. The default is QPSK.
GuardInt	Guard Interval	Use the up and down arrow buttons to specify the broadcast system's guard interval: 1/4, 1/8, 1/16, or 1/32. The default is 1/16.
TransMode	Transmission Mode	Use the up and down arrow buttons to specify carriers per Orthogonal Frequency Division Multiplexing (OFDM) frame: 2k or 8k. The default is 2k.
CodeRate-HP	Code Rate High Power	Use the up and down arrow buttons to specify the Forward Error Correction (FEC) rate (1/2, 2/3, 3/4, 5/6, or 7/8) used for the high power modulation. The default is 1/2.
CodeRate-LP	Code Rate Low Power	Use the up and down arrow buttons to specify the FEC rate (1/2, 2/3, 3/4, 5/6, or 7/8) used for the low power modulation. The default is 1/2.
Hierarchy	Hierarchy	Use the up and down arrow buttons to specify the broadcast system's hierarchial indication: Alpha(1), Alpha(2), Alpha(4), or Non-hier. If the broadcast system is not hierarchial, select Non-hier. The default is Non-hier.
OtherFreq	Other Frequency	Use the up and down arrow buttons to specify (YES or NO) if the broadcast system has other frequencies that are in use. The default is NO.

Control Menu

Control

The following diagram shows an SE encoder in Local mode. The Control option is locked (read-only) and should remain locked, unless the operator is troubleshooting a TMX environment. Below is a description of the two modes:



Local : Local mode is the factory-default setting and allows the operator to use the arrow buttons to view and change all options. Standalone SE encoders should keep the Control mode set to Local.

WARNING: *Changing an SE encoder from Local to Remote will lock out the ability to change all SE encoder options. To return the SE encoder to Local mode, perform the procedure at the bottom of this page.*

Remote : Remote mode allows the operator to view all settings, but not change them. If the encoder is connected to an IP network with a TMX-2010, the encoder is probably under TMX control.

Typically, there is no need to manually change from Local to Remote, or vice versa, because the TMX operator can do this at the TMX Element Manager GUI. However, for troubleshooting purposes, the SE encoder operator may need to perform the following procedure.

To change the Control mode to Remote or Local

1. Navigate to the Software Version menu as shown below.

2. To unlock the Control option, enter the following button sequence:

   ENTER
   Right arrow (>)
   Right arrow (>)
   Left arrow (<)
   Right arrow (>)
   Up arrow (∧)

   This button sequence has no other function but to unlock the Control option.

3. Navigate to the Control menu, press the right arrow (>) until the pointer is in front of Control, and press ENTER.
4. Use the up or down arrow button to choose either Local or Remote and press ENTER.

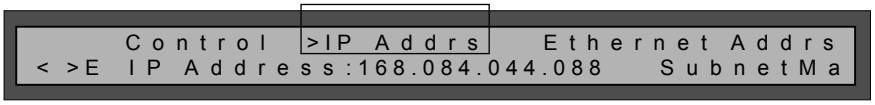
   When the operator uses the arrow buttons to exit the Control menu, the encoder will return to the locked state.

IP Addrs

The IP Addrs option has three editable values: IP Address, SubnetMask, and Gateway IP. To view a specific value, go to the Control menu, use the arrow buttons to place the cursor (>) in front of IP Addrs, and press ENTER. Now use the right and left arrow buttons to display the value. To change a value, move the cursor to the desired location and use the up and down arrow buttons to change each digit. After changing the values, press ENTER to return the cursor to the Menu Line.

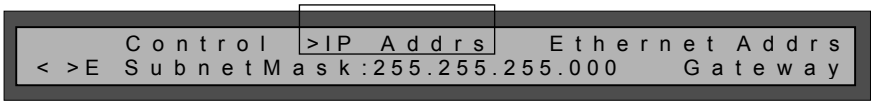
IP Address

The following diagram shows an example IP address:



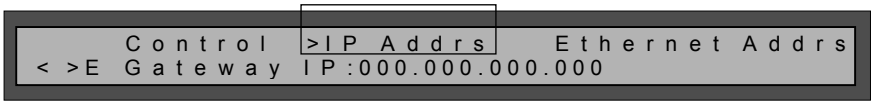
Subnet Mask

The following diagram shows the default Subnet Mask:



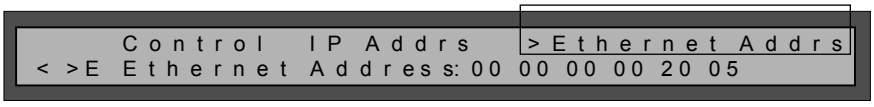
Gateway IP

The following diagram shows the default Gateway IP:



Ethernet Addrs

To view the Ethernet address [also known as the Media Access Controller (MAC) address], go to the Control menu and press the right arrow (>) button until the pointer is in front of Ethernet Addrs. The following diagram shows an example Ethernet address:



Important: *The Ethernet address is read-only, set at the factory, and cannot be changed.*

Misc Menu

This setting only applies if the video IN (input) option is set to NTSC or PAL-M. The video IN option is described at the top of Table 2 on page 13.

Use the Miscellaneous Menu to remove or preserve the NTSC or PAL-M setup (analog). To change this option, navigate to the Misc menu, press ENTER, and change the Setup Removal option by selecting either ON (removes the NTSC or PAL-M video setup) or OFF (preserves the NTSC or PAL-M video setup). The default is OFF.

Test Menu

Use the Test menu to replace the source signal or when a source signal is not available. Table 12 describes each option.

Table 12 Test Options

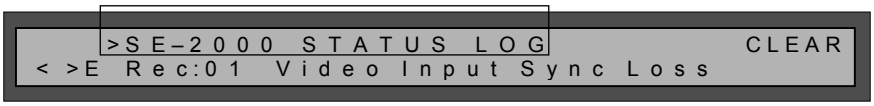
Option	Description
Video	Select ON to replace the external video signal with encoder's color bar test pattern. Select OFF to replace the color bars test pattern with the external video signal. The default is OFF.
Audio1	Select ON to replace the external audio signal on Audio1 with a 1 kHz test tone that is generated by the encoder. Select OFF to stop the test tone and replace it with the external audio signal. The default is OFF.
Audio2	Select ON to replace the external audio signal on Audio2 with a 1 kHz test tone that is generated by the encoder. Select OFF to stop the test tone and replace it with the external audio signal. The default is OFF.

Status Log Menu

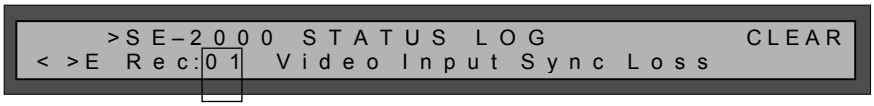
Use the encoder's Status Log menu to view messages. For more details, see "Log Messages" on page 27.

To view the log message

1. Navigate to the SE-Status Log menu as shown below.



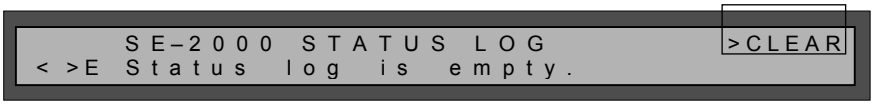
2. Press ENTER and use the right arrow button to go directly to a specific message number.



3. To return the cursor to the Menu Line (top line), press ENTER.

Clear Status Log

To clear all log messages, press the right arrow (>) button until the pointer is in front of CLEAR as shown below and press ENTER twice.



Note: *If no messages are recorded, the LCD displays:* Status log is empty.
Resetting or power cycling the encoder does not clear log messages.

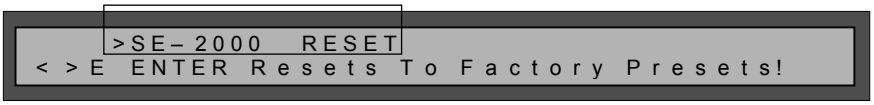
Reset Menu

Use the Reset menu to reset presets 1 to 30 back to the factory-defined defaults.

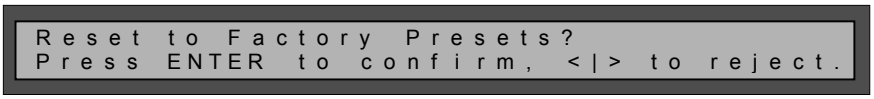
CAUTION	*The following procedure deletes all user-defined configurations and returns all values to the factory-defined defaults as shown in Table 1 on page 9. This procedure does not clear the Status Log which is described on page 25.*

To reset the SE encoder

1. Navigate to the RESET menu as shown below and press the ENTER button.



2. Verify that the following message is displayed:



3. To reset the encoder to factory-defined presets, press ENTER twice.

   or

   To exit this LCD screen without resetting the encoder, press the left arrow button and then the down arrow button.

Software Version

This menu displays the product name (SE-1010 or SE-2000) and the software version number.

A

Log Messages

Log messages are categorized by two levels of severity:

- Warnings are non critical faults.
- Faults (shown in **bold** in Table A-1 on page 28) activate the Form_C circuit on the back panel and light up the Fault LED on the front panel.

Table A-1 on page 28 shows the four categories of log messages:

- PP : Packet Processor
- AP_1 : Audio Processor A
- AP_2 : Audio Processor B
- Miscellaneous : Video Input Sync-Loss and Video Input Sync

The following bullets describe log message:

- Each fault and/or warning results in a log message.
- 01 is the most recent log, 02 is the next log, and 99 is the oldest log.
- If 99 log messages are recorded and another log message occurs, message 99 is deleted, all other messages are incremented by 1, and the new message is added at location 01.
- Each log message is recorded only once for each Digital Signal Processor (DSP): Packet Processor, Audio Processor A, and Audio Processor B. However, when no faults and warnings messages exist for a particular DSP, a log message may reoccure.

Table A-1 Log Messages

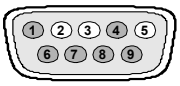
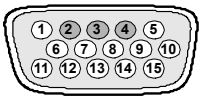
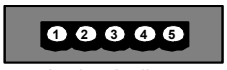
Fault Location	Log Message	Resulting Action
Packet Processor	**PP DSP Unrecoverable**	Form_C
	PP Decoder FIFO Underflow	
	PP Decoder FIFO Overflow	
	PP Packet Filter Error	
	PP Packet Processing Error	
	PP Audio Pkt Process Error	
	PP Double Ready Error	
	PP Audio A PTS Error	
	PP Audio B PTS Error	
	PP Video FIFO Overflow	
	PP Picture Size Warning	
	PP EPROM Checksum Test Fail	(Power-on self test) Form_C
	PP Internal SRAM Test Failed	(Power-on self test) Form_C
	PP External SRAM Test Failed	(Power-on self test) Form_C
	PP Communication Error	
	No PP Faults/Warnings	(This means no PP faults and warnings exist.)
Audio1 Processor	AP_1 Coded Audio Sourc Error	
	AP_1 Computation Timeout	Form_C
	AP_1 TX Over/Underflow	Form_C
	AP_1 Receiver Over/Underflow	Form_C
	AP_1 Lipsync Maximum Delay	
	AP_1 Lipsync Minimum Delay	
	AP_1 Lipsync Program Error	
	AP_1 Unrecoverable Error	Form_C
	AP_1 EPROM Checksum TestFail	(Power-on self test) Form_C
	AP_1 Internal SRAM Test Fail	(Power-on self test) Form_C
	AP_1 External SRAM Test Fail	(Power-on self test) Form_C
	AP_1 Communication Error	
	No AP_1 Faults/Warnings	(This means no Audio1 faults or warnings exist.)
Audio2 Processor	**AP_2 Computation Timeout**	Form_C
	AP_2 TX Over/Underflow	Form_C
	AP_2 Receiver Over/Underflow	Form_C
	AP_2 Lipsync Maximum Delay	
	AP_2 Lipsync Minimum Delay	
	AP_2 Lipsync Program Error	
	AP_2 Unrecoverable Error	Form_C
	AP_2 EPROM Checksum TestFail	(Power-on self test) Form_C
	AP_2 Internal SRAM Test Fail	(Power-on self test) Form_C
	AP_2 External SRAM Test Fail	(Power-on self test) Form_C
	AP_2 Communication Error	
	No AP_2 Faults/Warnings	(This means no Audio2 faults or warnings exist.)
Miscellaneous	Video Input Sync-Loss	
	Video Input Sync	(This means video input sync has been reacquired.)

B

Connector Pinouts

Table B-1 lists the necessary connector pinouts for all possible cable connectors.

Table B-1 Connector Pinouts

Connector	Pin	Signal
 Form_C	1	Common
	2	N. C. (Normally Closed)
	3	N. O. (Normally Opened)
 Log (Only For Motorola BCS Support Personnel)	1	(Unused)
	2	Tx
	3	Rx
	4	(Unused)
	5	GND
	6	(Unused)
	7	(Unused)
	8	(Unused)
	9	(Unused)
 DHEI	1	SHLDGND
	2	(Unused)
	3	(Unused)
	4	(Unused)
	5	SIGND
	6	SENSEL
	7	PSYNC+
	8	PDAT+
	9	PCLK+
	10	REFCLK+
	11	SENSER
	12	PSYNC-
	13	PDAT-
	14	PCLK-
	15	REFCLK-
 Analog Audio	1	Left (+)
	2	Left (-)
	3	GND
	4	Right (+)
	5	Right (-)

C

Connectors and Required Cables

Table C-1 lists the SE-1010 and SE-2000 connectors.

Table C-1 Connectors

Type	MCN	Description
Alarm	471988-001	Form_C Connector (Provided with the encoder)
Audio	469047-001	Analog Audio Connector [Phoenix Type] (Provided with the encoder)

Table C-2 lists required cables for the SE-1010 and SE-2000.

Table C-2 Required Cables

Type	MCN	Length	Description
ASI	N/A	0 to 100 m	75 ohm Coax
DHEI	461907-001	20"	Encoder to IRT A side of duplex
DHEI	461907-002	40"	Encoder to IRT A side of duplex
DHEI	461907-003	80"	Encoder to IRT A side of duplex
DHEI	461909-001	20"	Encoder to IRT B side of duplex
DHEI	461909-002	40"	Encoder to IRT B side of duplex
DHEI	461909-003	80"	Encoder to IRT B side of duplex
DHEI	462244-001	20"	Encoder to TMX-2010 / MPS
DHEI	462244-002	40"	Encoder to TMX-2010 / MPS
DHEI	462244-003	80”	Encoder to TMX-2010 / MPS (Provided with the encoder)

D

Specifications

The following tables provide all SE-1010 and SE-2000 specifications.

Transport Output	Connectors
DVB-ASI	BNC, Female (x2, Main and Monitor)
DS3	BNC, Female (x1)
DHEI (29.26 MHz)	HD-15, Female (x1)

Input Video	Connectors
Serial Digital 4:2:2 Per SMPTE-259M and SMPTE-125M (Also Embedded Audio)	BNC (75-ohm), Female (x2, Input and Loop)
Analog Composite Per RS-170A and CCIR 624-4	BNC (75-ohm), Female (x2, Input and Passive Loop Through)

Input Audio	Connectors
AES3	BNC (75-ohm), Female (x2)
Analog (High Impedance)	Terminal Block (x2): (Balanced, L1±, R1±, GND, L2±, R2±)

Status / Control	Connectors
10/100BaseT Ethernet Per IEEE-802.3	RJ-45 (x1)
Asynchronous Per EIA-232 (9600 Baud, 1 Start Bit, 8 Data Bits, 1 Stop Bit, No Parity)	DSUB-9, Female (x1)
Form_C Relay Contact	Terminal Block

Vertical Blanking Interval	Description
DigiCipher II CC	Line 21 (field 1 and 2) per EIA-608 data processed per SCTE DVS-157. NTSC, PAL-M, and 525SDI modes.
DTV CC	Line 21 (field 1 and 2) per EIA-608 data converted to ATSC A/53 and EIA-708B. NTSC, PAL-M, and 525SDI modes.
SID/AMOL1	Line 20 (field 1) and Line 22 (field 2) per SCTE DVS-053. NTSC, PAL-M, and 525SDI modes.
SID/AMOL2	Line 20 (field 1 and 2) and Line 22 (field 1 and 2) per SCTE DVS-053. NTSC, PAL-M, and 525SDI modes.
NABTS	Any specified VBI line and field per SCTE DVS-053. NTSC, PAL-M, and 525SDI modes.
WST	Any specified VBI line and field per DVB ETSI EN 300 472. PAL and 625SDI modes.

Video Processing	Description	
Mode	OFF	
	NTSC, Analog Composite	
	PAL, Analog Composite	
	PAL-M, Analog Composite	
	525 CCIR601 (Default)	
	625 CCIR601	
Resolution at 4:2:0	720 x 480 (NTSC, PAL-M, or 525 CCIR601)	
	704 x 480 (NTSC, PAL-M, or 525 CCIR601)	
	544 x 480 (NTSC, PAL-M, or 525 CCIR601)	
	528 x 480 (NTSC, PAL-M, or 525 CCIR601)	
	480 x 480 (NTSC, PAL-M, or 525 CCIR601)	
	352 x 480 (NTSC, PAL-M, or 525 CCIR601)	
	720 x 576 (PAL or 625 CCIR601)	
	704 x 576 (PAL or 625 CCIR601)	
	544 x 576 (PAL or 625 CCIR601)	
	528 x 576 (PAL or 625 CCIR601)	
	480 x 576 (PAL or 625 CCIR601)	
	352 x 576 (PAL or 625 CCIR601)	
Resolution at 4:2:2	720 x 512 (NTSC, PAL-M, or 525 CCIR601)	*[SE-2000 Only]*
	720 x 480 (NTSC, PAL-M, or 525 CCIR601)	*[SE-2000 Only]*
	544 x 480 (NTSC, PAL-M, or 525 CCIR601)	*[SE-2000 Only]*
Compression Rate	0.5 Mbps to 15.0 Mbps (10 kbps Increments)	*[SE-2000 Only]*
	1.0 to 15.0 Mbps (10 kbps Increments)	*[SE-1010 Only]*
	0.1 Mbps or 0.2 Mbps (Still Frame)	*[SE-1010 and SE-2000]*

Audio Processing	Description
Inputs	Digital
	Analog
	CCIR601 (Embedded Audio)
Modes	Stereo
	Joint Stereo
	Mono L
	Mono R
	Dual Mono
	Pre compressed
Sample Rates	32 to 96 K samples per second (Rate converted to 48 K samples per second)
Compression Rates	96, 112, 128, 160, 192, 224, 256, 320, and 384 kbps
	448, 512, 576, and 640 kbps (AC3 only)

Program Processing	Value
PES/Transport Alignment	Yes
Video PID	32 to 8187, Default 32 (Decimal)
Audio PID (Channel 1)	32 to 8190, Default 33 (Decimal)
Audio PID (Channel 2)	32 to 8190, Default 34 (Decimal)
PMT PID	32 to 8190, Default 35 (Decimal)
WST PID	32 to 8190, Default 36 (Decimal)
Allow PID Contention	No
MPEG Program Number	1 to 65535, Default 1 (Decimal)
Transport Stream ID	0 to 65535, Default 1 (Decimal)

Physical	Rack Requirement
Height	1.75” (1 U)
Width	17.3”
Depth	19.8”
Mounting	Rack stackable in standard 19” W x 32” D stack

Important: *SE encoders are stackable, one on top of another, within a rack, without any spacing requirements. Place each SE encoder in a stable and level position within the rack and ensure that all front enclosure screws are tightened to 2 ft.-lbs. If multiple SE encoders are installed in a rack assembly, the operator may choose to have a certification agency evaluate the condition of the rack.*

Elevation(s)	Required Temperature
Sea Level	0 to 40° C
5,000 feet Above Sea Level	0 to 37° C
10,000 feet Above Sea Level	0 to 34° C

Important: *The above temperatures must be measured inside the rack. SE encoders require sufficient ventilation and air conditioning. To ensure safe operation, proper airflow must be maintained at all times.*

Power	Description
AC Input	115 – 230 VAC, 50 – 60 Hz, 1 Amp

Important*: Reliable earthing must be maintained to ensure proper grounding for the SE encoder. To ensure that circuits are not overloaded, read the encoder’s UL power label. If the SE encoder is connected to a power strip, rather than a branch circuit’s direct connection, use special care to ensure that the unit is properly connected.*